

## Claims

1. A selective hydrogenation catalyst comprising:  
an inorganic oxide support selected from alumina, titania, and a chemical  
5 composite of alumina and titania;  
a major active component Pd of a content of about 0.002-1.0 % based on the  
total weight of the catalyst; and  
at least one promoter selected from Group IB metals, the mole ratio of  
palladium to the Group IB metal being in the range of about 1 to about 20;  
10 wherein the major component palladium and the promoter are uniformly  
distributed together in the catalyst body within the thickness between the support  
surface and the depth of more than about 300  $\mu\text{m}$ .

2. The catalyst according to claim 1, wherein the content of alumina in the  
15 chemical composite of alumina and titania is about 1-99 % by weight.

3. The catalyst according to claim 2, wherein the content of alumina is about  
20-80 % by weight.

4. The catalyst according to claim 3, wherein the content of alumina is about  
20 40-60 % by weight.

5. The catalyst support according to claim 4 comprising the following  
physical properties: bulk density of about 0.7-0.9 g/ml, pore volume of about 0.3-  
25 0.6 ml/g, specific surface area of about 10-60  $\text{m}^2/\text{g}$ , mean pore diameter of about  
40-100 nm.

6. The catalyst according to claim 1, wherein the content of the major active  
component-palladium is about 0.005-0.5 wt%.

7. The catalyst according to claim 6, wherein the content of the major active  
component-palladium is about 0.01-0.05 wt%.

8. The catalyst according to claim 1, wherein the promoter is selected from the group consisting of Cu, Ag, and Au.

9. The catalyst according to claim 1, wherein the mole ratio of palladium to the Group IB metal is in the range of about 1-10.

10. The catalyst according to claim 9, wherein the mole ratio of palladium to the Group IB metal is in the range of about 1.0-5.0.

11. The catalyst according to claim 1, wherein the active component, palladium and the promoter, Group IB metal existing in the form of oxides in the support are reduced to fine alloy particles with a diameter of about 2-10 nm.

12. The catalyst according to claim 1, wherein the dispersion depth is within the thickness between the support surface and the depth of about 500-1000 $\mu$ m.

13. The catalyst according to claim 1, further comprising alkali metals and/or alkali earth metals.

14. The process for preparing the catalyst according to claim 1, comprising the following steps:

preparing an inorganic oxide support, which is selected from alumina, titania, and a chemical composite of alumina and titania;

impregnating the active component,

wherein the inorganic oxide support is impregnated with a mixed solution of water soluble inorganic salts of palladium and a Group IB metal to allow the active component palladium and the group IB metal promoter to be absorbed into the pores of the support together and uniformly distributed in the catalyst body within a thickness between the support surface and the depth of more than about 300  $\mu$ m,

wherein the inorganic salts of palladium and the Group IB metal are dissolved in deionized water to form an impregnation solution, the total

amount of which equals the pore volume of the support, and

wherein the pH value of the impregnation solution is adjusted to be about 1-4 to control the dispersion depth of the active component and the promoter and then the impregnated support is dried at about 80-150 °C; and

5 decomposing the catalyst, wherein the supported catalyst is decomposed in an air atmosphere at about 300-800 °C for about 2-10 h, and wherein the active component and the promoter exist in the catalyst body within the thickness between the support surface and the depth of more than about 300 μm.

10 15. The preparation process according to claim 14, wherein the supported catalyst is decomposed at about 400-500 °C.

16. A process for preparing the chemical composite support of alumina and titania, comprising the following steps:

15 dissolving  $\text{MAI}\text{O}_2$  and titanium salt solutions in water at about 20-80 °C;

neutralizing the mixture with a MOH solution to neutrality to form a co-precipitate of aluminum-titanium hydroxide, which is stirred for about 10-30 h to form uniform crystal particles;

20 filtering the resultant to wash away the  $\text{M}^+$  and acid radical negative ions with deionized water;

drying the derived aluminium-titanium hydroxide at about 100-150 °C;

after pulverizing, forming a solid sample by kneading; and

calcining the solid sample at about 800-1100 °C to obtain the chemical composite support of alumina-titania, wherein the M is Na, K, or Li.

25 17. The use of the catalyst according to claim 1 in the selective hydrogenation of alkynes and dienes.

30 18. The use of the catalyst according to claim 1 in the selective hydrogenation of  $\text{C}_2$ ,  $\text{C}_3$ , or  $\text{C}_2$  and  $\text{C}_3$  mixed feed containing any contents of hydrogen and CO.